

nerve, in such a way, as to provoke contraction of the muscles animated by that nerve. It is beyond doubt that the faradic current diffuses itself through the tissues, as well as those of the brain skin and muscles, as is proven, moreover, by the galvanometric experiments of MM. Carville and Duret, and in consequence, we are justified to attribute the effects produced, not to excitation of the gray substance, but to that of the white matter below it.

"We may admit that in the white substance situated below the parts experimented upon, those are excitable fibres in relation, by their deep terminations, with the direct centres of excitation of the muscles smooth and striped, and the glands. These fibres are irritated by the electric current, and they put in action the excitory centres.

"But if the excitability of the gray cortical substance is not demonstrated by all the experiments, the existence of motor centres for the members, localized in special parts of this substance is no better proven, and needs to be supported by further facts to be put beyond doubt."

Goltz, *Pflueger's Archiv*. XIII., I, May, 1876, publishes a lengthy article detailing his experiments on the brains of animals. His method was to trepan the skull, and wash out portions of the brain substance with a jet of warm water, the vessels being, to a great extent, avoided by this procedure. He thinks from these experiments, that the extent of the injury is of more importance than its locality, in causing disturbance of function. Thus, he says, the character of the disturbance is the same, whether the trepanation was performed over the anterior margin of the so-called irritable zone of Hitzig, or back in the region of the posterior lobes. This is not, of course, in agreement with other observers; the reason may be, and probably is, in the comparative coarseness of Prof. Goltz's method. His results are, however, of great interest; the observations were directed to the disorders of sensibility, of vision and of motility, caused by destruction of a portion of the cerebral substance of one hemisphere.

In regard to the first of these, he found that the destruction of a considerable portion of the brain of a dog, caused almost at once, a decided loss of sensibility upon the opposite side of the body; it appeared quite anæsthetic, the anæsthesia diminishing in a short time, but still leaving impaired sensibility, especially to pressure.

A considerable part of one hemisphere was removed, by Goltz's method, in a dog. The animal, immediately after the operation, was found to be blind in the eye of the opposed side, which, however, recovered its function in a few days, at least, in part. Still, there seemed to be a defect of vision; objects that formerly excited anger or fear did so no more; he did not appear even to distinguish a piece of meat laid near him on the right. A very interesting series of experiments were performed on another dog, that had been submitted to several of these operations, and the well eye removed. The author, holding that each eye is in relation with both hemispheres, rejects the theory of Lussana and Lemoigne, that visual sensations in such cases have lost their perceptive centre on the opposite side

of the brain, and supposes, instead, that there is only an imperfect perception, which, while allowing the animal to progress without running against obstacles, does not enable him to ascertain their nature. He rejects any theory of psychic disturbance causing the phenomena.

The disorders of motility are the most striking results of injury to one hemisphere of the brain. The first consequence is a motor paralysis of the opposite side, which, however, soon disappears as far as locomotive motility is concerned; but the animal is still unable to perform certain acts as well as previously. Thus the animal is unable to give the foot of the side opposite the lesion at command, though it formerly did so. Other peculiarities, such as a tendency to stand on three feet, were also noticed at a late stage, while in progression all four were used.

Dr. Goltz divides the symptoms which follow injuries to the brain into two classes, the temporary, or phenomena of inhibition, and the permanent or abatement symptoms (*Ausfallserscheinungen*). The first of these, the paralysis, etc., are, he claims, due to an inhibitory influence exercised from the injured cortex to the motor centres. These, after a time, recover their irritability and functions. The condition is similar to that observed after section of the cord in a dog, which is followed by paralysis of the sphincters, bladder, etc. It does not follow that the centres for these organs are cut off, for that has been proven not to be the fact, but they suffer an inhibition caused by the injury. The second series of symptoms, lasting in their character, are, he holds, due to the injury to the nerve substance; such are the inability to correctly distinguish pressure, form, or to perform certain movements.

After the injury had been recovered from for a long time, and the animal was then killed, the injured side of the brain is found to present a marked difference, as compared with the other. The convolutions are fewer and less sinuous, and the hemisphere appears like that of an animal lower in the grade of nervous organization. The cause of this is, evidently, that the half of the brain thus relieved from pressure of its surroundings increases in volume and fills up the cavities, without fully restoring the organization.

THE MOVEMENTS OF THE BRAIN.—At a meeting of the French Acad. des Sciences, in June last (rep. in *L'Union Médicale*), M. Salathé reported the results of experiments performed by himself, for the purpose of registering the movements of the brain as follows:

After trepanning the skull of an animal, making a hole 2 centimetres in diameter, he fitted to it a glass tube, closed above by a rubber stopper, traversed by a small glass tube which is continued in a rubber tube, that terminates finally in a diaphragm with lever attachment. Liquid is placed in this apparatus so that its level reaches about the middle of the small glass tube. By it the slightest oscillations of the liquid can be detected and registered on a revolving cylinder on which, at the same time, the trace of the respiration and the heart may be taken.

The details of these experiments performed in the laboratory of Prof. Marey, will be published at a future time; the following, however, are the principal results obtained: